

P. M. SAGAR, A. MEAGHER, S. SOBCZAK and B. G. WOLFF. Chemical composition and potential hazards of electrocautery smoke. *British Journal of Surgery* (1996) 83, 1792.

Link - <https://www.ncbi.nlm.nih.gov/pubmed/9038572>

Electrocautery is widely used for dissection of tissues and cauterization of blood vessels. A visible plume of smoke is produced, which has an unpleasant odour and can induce acute and chronic inflammatory changes in the respiratory tract'. Airborne particles are not effectively filtered or evacuated by operating room scavenging systems and facial masks only offer protection from large particles. Little is known about the chemical composition of this smoke and the health risks to the operating room staff have not been identified.

The aim of this study was to determine the chemical composition of electrocautery smoke produced in the course of standard colorectal surgery.

Methods

Multiple samples of the smoke plume generated by the use of electrocautery were collected by means of a small calibre (6.35 mm diameter) plastic tube taped near to the end of the electrocautery pencil or held in the plume above the pencil. The flow rates used to collect the analyte were chosen according to National Institute for Occupational Health and Safety guidelines'. The constituents of the collected smoke were determined by high performance liquid chromatography, gas chromatography with a thermal energy analyser, ion chromatography and mass spectrometry. Specifically, smoke samples were tested for polycyclic aromatic hydrocarbons, nitrosamines, nitrates, nitrites and volatile organic compounds. The collection of smoke was continuous throughout each operation.

Results

Electrocautery smoke was found to contain significant levels of benzene, ethyl benzene, styrene, carbon disulphide and toluene. Detectable quantities of at least one of these chemicals was found in each of the patients studied. No such chemicals were found in the control experiment. No nitrates, nitrites or nitrosamines were detected.

Discussion

Previous studies of electrocautery during reduction mammoplasty have shown the smoke to be mutagenic but the authors were unable to identify the organic compounds involved^{3,4}. Benzene, a known carcinogen, was identified in the current study in significant quantities.

The recommended amount of exposure to benzene is nil. The detection of benzene in the smoke in the present study is therefore a matter of some concern. None of the other substances detected is a carcinogen but each is known to cause irritation to the eyes, dermatitis, central nervous system effects, and hepatic and renal toxicity

Nevertheless, in view of the widespread use of electrocautery, further studies would appear to be needed to determine the extent of exposure of all operating room personnel and, if necessary, to develop methods to reduce risks to health.